CHAPTER 9
PARTICIPANT DEMAND PROJECTIONS

During the Phase 1 process of identification of existing water-supply demands, Reclamation was presented with water-supply projections developed by several study-area participants. Some of these future water-supply demands were based upon population growth and water-use rate projections that Reclamation could not endorse. The future water-supply demands ultimately used by Reclamation in the modeling scenario were developed from records of water diversions and delivery, local and national trends in water use rates, and projections of population and industrial growth within the study area. Table 9.1 shows Reclamation and participant population and surface-water-demand projections. Additional details on these future demand projections are included in Appendix 1.

In an effort to provide some information for comparisons, several water-supply alternatives have been modeled using the participant demand estimated at Fargo. This particular demand is the

Table 9.1. Reclamation and participant population and surface-water-demand projections

Water User	Participant 2050 Projections		Reclamation 2050 Projections	
	Population Estimate	Annual Surface-Water Demand [1] (acre-feet)	Population Estimate	Annual Surface-Water Demand [1] (acre-feet)
Fargo	243,072	67,122	192,600	36,610
West Fargo	28,050	4,919	33,300	5,703
Moorhead, MN	42,358	8,882	42,600	8,918
Valley City	10,923	1,824	6,570	1,255
Grand Forks	98,339	24,418	93,200	23,741
East Grand Forks	9,013	1,764	8,700	1,712
Grafton	7,416	1,588	5,100	1,242
Drayton [2]	1,380	4,137	900	758
Rural Water [3]	137,500	8,096	137,500	8,096
Existing Industry		6,000		6,000
Future Industry		24,000		24,000
TOTALS	578,051	152,750	520,470	118,035

[1] Excludes groundwater demands. Groundwater withdrawals were maintained at the 1994 level.
[2] Drayton Participant estimate includes large industrial component.
[3] Rural Water Systems estimated by Reclamation only.

largest in the study area and has the greatest potential impact on supply alternatives. These model runs give an indication of the water-supply impacts resulting from a change (increase) in the demand needs. Water-supply shortages for the year 1934 (year of greatest shortages) for these two demand scenarios under the No Action Alternative are shown in Table 9.2.

Table 9.2. Participant and Reclamation projected worst-year baseline (No Action) shortages, in acre-feet

"1934" Shortages	Municipal Shortage	Industrial Shortage	Total Annual Shortage
Participant Demand	57,220	23,690	80,910
Reclamation Demand	31,030	22,160	53,190
Rural Water Systems	8,096		8,096

In addition to the No Action Alternative, two "in-basin" alternatives and two "import" alternatives were also modeled using the participant demand projections at Fargo with Reclamation demand projections at other cities, industries, and rural water systems. HYDROSS model runs for Alternative 2, Kindred Reservoir; Alternative 3, Enlarged Lake Ashtabula; Alternative 5, Bismarck to Fargo Pipeline; and Alternative 7, Import Using the GDU Facilities; have been completed for the year 2050 using the participant demand at Fargo and the Reclamation demand in all other places. These model runs are presented in an abbreviated form and are for information purposes only. The model runs have not been checked and reviewed as extensively as those used in chapter 6 and are considered to be "provisional." Evaluations are not presented for these participant demand scenarios, although their financial ramifications were discussed in chapter 8.

Alternative 2P; Kindred Reservoir with Participant Demands.

Using the participant demand projections, rather than Reclamation's, results in a much greater draw on the Sheyenne and Red River systems. This increased draw on the rivers means that less water would be captured and stored in Lake Ashtabula and Kindred Reservoir. Under these circumstances, for instance, storage in the new Kindred Reservoir could not exceed 30,000 acre-feet at any time during the 1930s drought cycle. Beginning reservoir contents are one-half of the active storage, which is same criterion used for this alternative in chapter 6. The end-of-month reservoir contents for the modeled 1930s-style drought are shown in figure 9.1. Shortages remain in the study area under this scenario due to the smaller active storage size of Kindred Reservoir. These shortages are summarized in table 9.3.

This alternative also includes a ring-dike reservoir on the Red River near Fargo. The inflows to that reservoir are also more limited due to the increased demand on the Red River at Fargo. The end-of-month contents of the ring-dike reservoir (figure 9.2) illustrate the difference between the two demand projections.

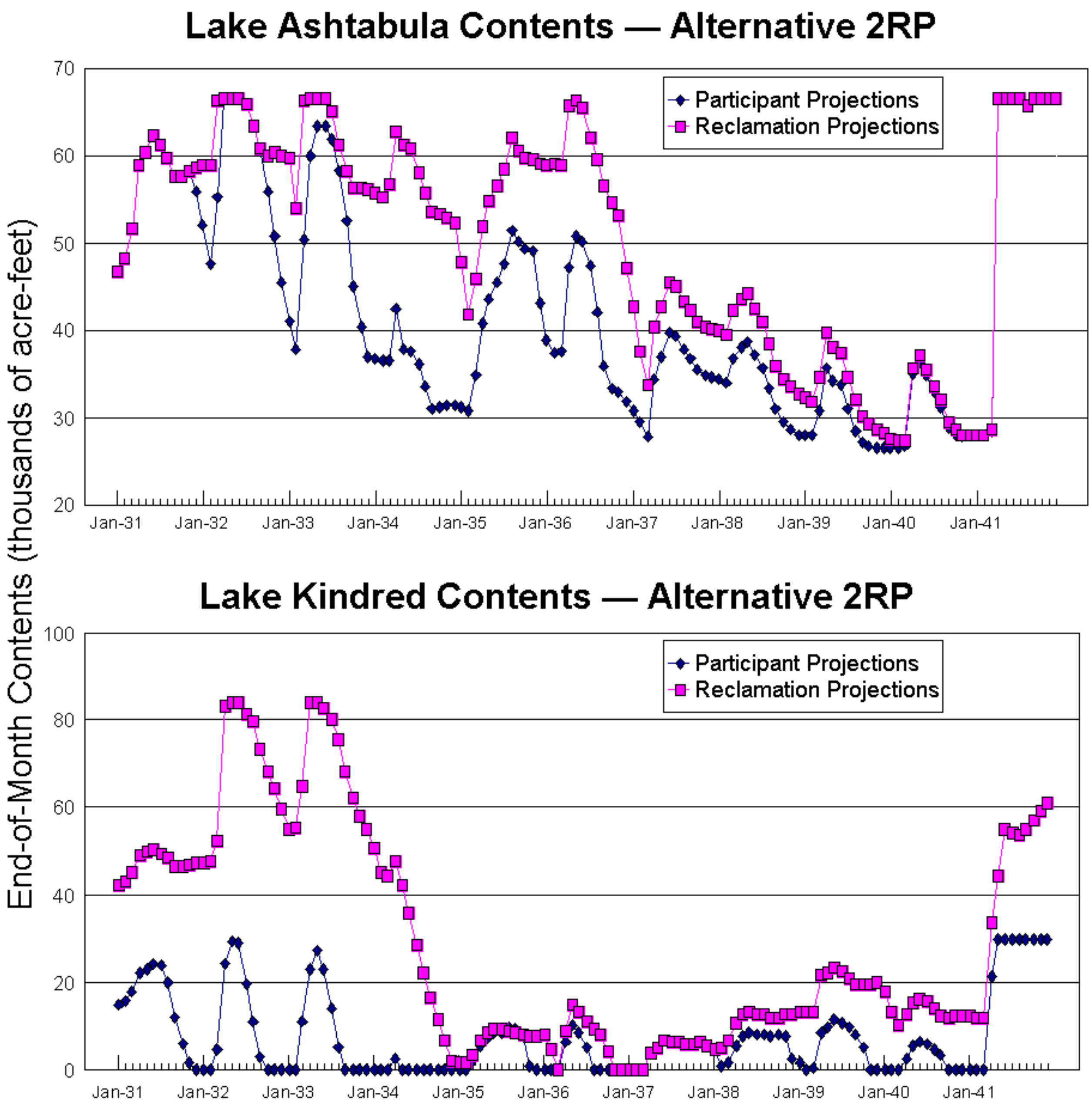

Figure 9.1.—Alternative 2 (Kindred Reservoir). 1931–42 end-of-month contents for Lake Ashtabula and Lake Kindred under Participant and Reclamation projections.

Alternative 3P: Enlarged Lake Ashtabula with Participant Demands

The increased demands on the Red and Sheyenne Rivers limit the amount of water that is available for storage in Lake Ashtabula. During the modeled drought period, using participant demands, the greatest amount of water that could be stored in an enlarged Lake Ashtabula is approximately 75,400 ac-ft, which is only 10 percent larger than the size of the existing reservoir. Figure 9.3 shows the projected end-of-month contents in Lake Ashtabula under

Table 9.3. Alternative 2 (Kindred Reservoir). Largest annual shortages using participant projections

Cities/Systems	Largest Shortage (acre-feet per year)	Industries	Largest Shortage (acre-feet per year)
City of Fargo	50,760 (1934)	Existing Cargill	4,230 (1934)
City of Moorhead	6,750 (1934)	New Industry 2	5,500 (1934)
City of West Fargo	1,030 (1934)	New Industry 3	4,480 (1934)
Valley City	390 (1940)	New Industry 5	220 (1940)
Combined Municipal	58,740 (1934)	Misc Industry	720 (1940)
Rural Water Systems: Northern Southern	 980 (1934) 3,730 (1934)	**Combined Industrial**	14,400 (1934)
Combined Rural	4,710 (1934)		

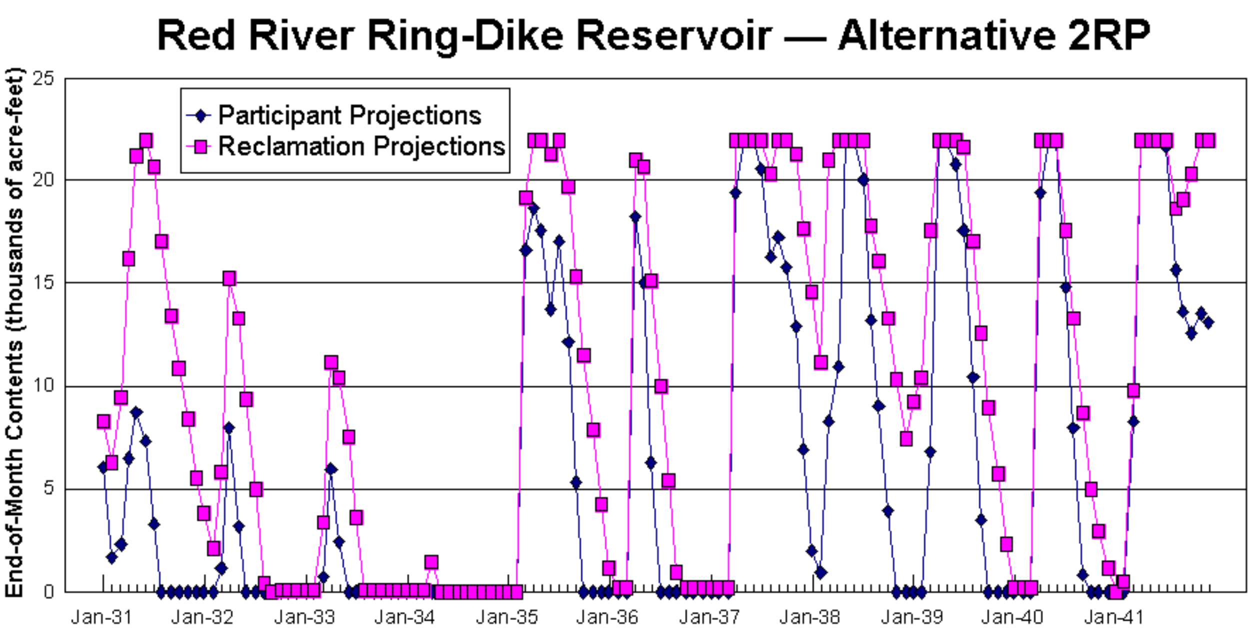

Figure 9.2. Alternative 2 (Kindred Reservoir). 1931–42 end-of-month contents for ring-dike reservoir on Red River under participant and Reclamation projections

Reclamation and participant demand projections. Similarly, the end-of-month content in the ring-dike reservoir (figure 9.4) is limited by the amount of flow available for diversion and storage.

With the limited size increase of Lake Ashtabula, there are shortages remaining in this model scenario. The remaining shortages, as shown in table 9.4, are the greatest for the year 1934.

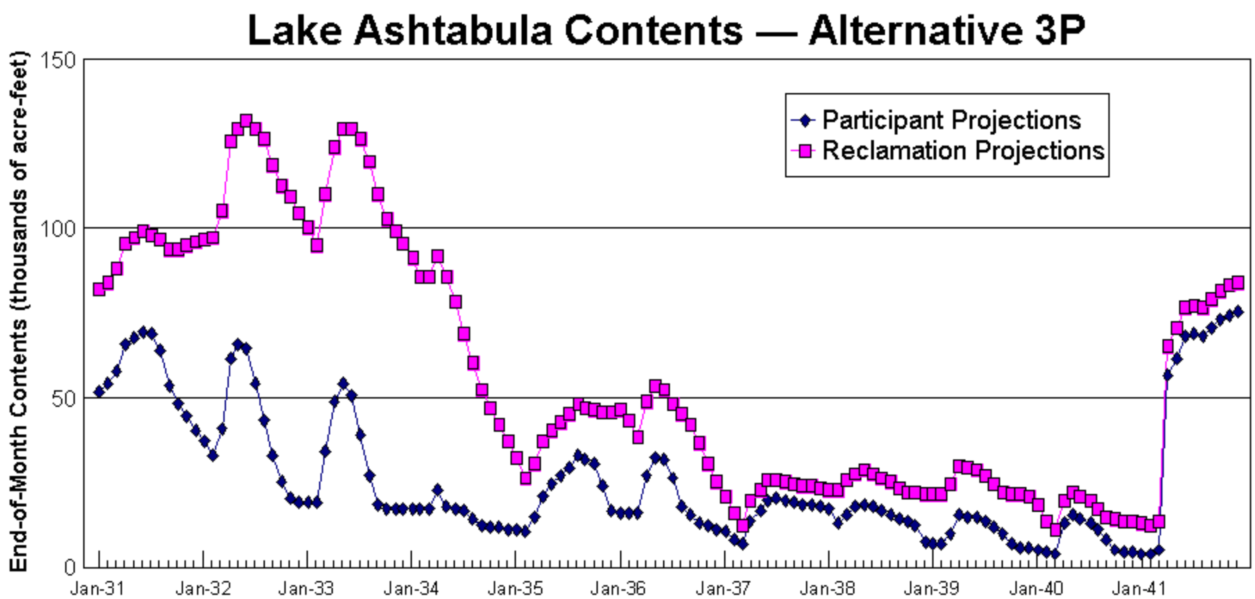

Figure 9.3. Alternative 3 (Enlarged Lake Ashtabula). 1931–42 end-of-month contents for Lake Ashtabula under participant and Reclamation projections.

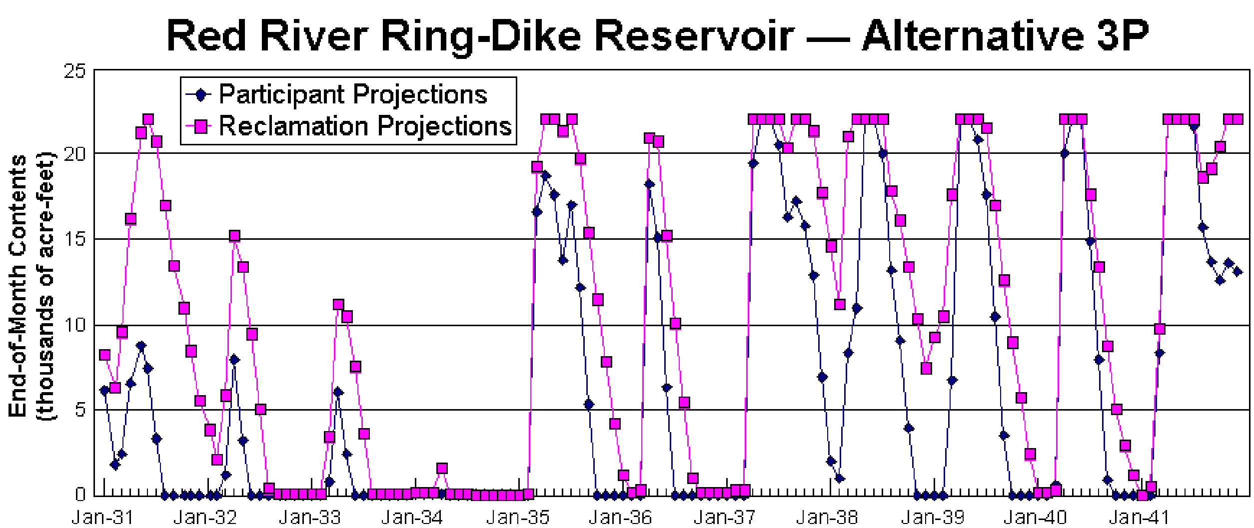

Figure 9.4. Alternative 3 (Enlarged Lake Ashtabula). 1931–42 end-of-month contents for ring-dike reservoir on Red River under participant and Reclamation projections.

Alternative 5AP: Bismarck to Fargo Pipeline with Participant Demands

Use of the participant demand in this import alternative has been modeled to determine the increased pipeline size needed to meet the increased demand. The pipeline import uses ring dikes at both Fargo and Wahpeton to re-regulate the imported flows. Ring dike re-regulation is proposed to lower the peak demand flow and help control the pipeline size needed.

Table 9.4. Alternative 3 (Enlarged Lake Ashtabula). Largest annual shortages using participant projections

Cities	Largest Shortage (acre-feet per year)	Industries	Largest Shortage (acre-feet per year)
City of Fargo	51,100	Existing Cargill	4,190
City of Moorhead	6,400	New Industry 2	4,830
Combined Municipal	57,500	New Industry 3	4,650
Rural Water Systems:		Misc. Industry	720
Northern	980	**Combined Industrial**	13,860
Southern	3,730		
Combined Rural	4,710		

The import flow needed to offset shortages modeled using the participant demand projections is estimated to be 106 cfs. Flow capacity estimated using Reclamation projections was 65 cfs. Assuming that the import pipeline is upsized accordingly, then no municipal, industrial, or rural water system shortages would remain under this scenario. Also, reservoir end-of-month contents for the ring dikes and Lake Ashtabula would be nearly identical to those projected in chapter 6 for Alternative 5A using Reclamation demands.

Alternative 7abcP: Import Using Existing GDU Facilities

Import alternatives 7A, 7B, and 7C use various portions of the existing Garrison Diversion Unit facilities. All of these imports are sized to meet shortages downstream on the Sheyenne River with some water transfer to the upper Red River for industrial shortages. Using the participant demand for Fargo increases the estimated size of the required import to the upper Sheyenne River system, from 72 to 122 cfs. End-of-month contents for Lake Ashtabula are nearly identical to those shown in chapter 6 for Alternatives 7A, 7B, and 7C using the Reclamation demand projections.